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AUG 16 2006

Remarks:

The above amendments and these remarks are responsive to the Office Action dated March 29, 2006.

Prior to entry of this Amendment, claims 1-31 and 36-45 were pending in the application. However, claims 2, 3, 5, 13, 14, 16, 24, 26, 37, 38 and 40 previously were withdrawn from consideration pursuant to an earlier restriction requirement. Claims 1, 4, 6-12, 15, 17-23, 25, 27-31, 36, 39, and 41-45 thus were considered in the May 16, 2006 Office action.

By this Amendment, applicants have amended claims 1, 6-8, 10, 12, 17-19, 21, 23, 25, 27-31, 36, 41, 42 and 44. No new claims have been added. Claims 9, 11, 20, 22, 37-40, 43 and 45 have been cancelled without prejudice. Upon entry of this Amendment, claims 1, 4, 6-8, 10, 12, 15, 17-19, 21, 23, 25, 27-31, 36, 41, 42 and 44 thus remain for consideration (and claims 2, 3, 5, 13, 14, 16, 24 and 26 remain pending, but withdrawn until such time as a generic claim is allowed).

In view of the amendments above, and the remarks below, applicants respectfully request reconsideration of the application under 37 C.F.R. § 1.111 and allowance of the pending claims.

Claim Objections

First considering formal matters, applicants note that claims 37, 39 and 41-45 are objected to inasmuch as claim 37 contains a typographical error indicating that the claim depends from itself (claims 39 and 41-45 depend from claim 37). By this amendment, claims 37-40, 43 and 45 are cancelled without prejudice. Claims 41, 42 and 44 are

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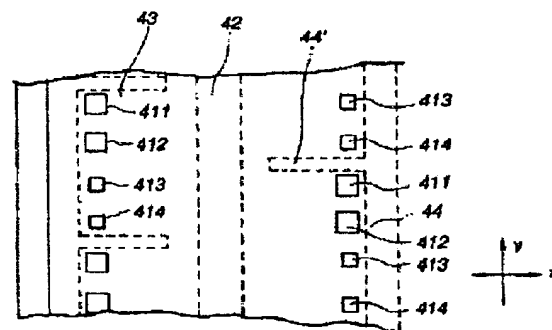
amended to depend from claim 36 (as the Examiner suggests). The claim objections thus are rendered moot.

Rejections under 35 USC § 102

In the May 16, 2006 Office Action, claims 1, 4, 8, 9, 11, 12, 15, 19, 20, 22, 23, 29, 31, 36, 39, 41-43 and 45 were rejected under 35 U.S.C. § 102(b) based on Tachihara et al (US 6,447,088 B2). Applicants respectfully disagree.

Tachihara discloses an ink-jet head having a plurality of ink discharging units, each including a discharging port, where a plurality of the discharging units have different amounts of ink discharge. This ink-jet head is included on an ink-jet-head cartridge which in turn is included in an ink-jet-apparatus. The ink-jet recording is performed by discharging different amounts of ink from the discharging ports "by selectively driving the plurality of discharging units."

FIG. 7



With reference to Fig. 7 of Tachihara (reproduced above for convenience of discussion), it will be appreciated that Tachihara discloses a plurality of discharging

units of various sizes (411-414). Recording is performed "by moving the head in the x-axis direction, ink droplets having large and small amounts of ink discharge can be superimposed on a pixel at a single scanning operation. As a result, this head can achieve recording having four gradation steps." Col. 6 lines 37-41.

Referring now to applicants' claims (as amended), claims 1 and 12 recite "a plurality of nozzles variously configured according to a predetermined intended distribution, the plurality of nozzles having a target mean drop volume and an actual mean drop volume; and" a controller or control system "configured to set the actual mean drop volume provided by the plurality of nozzles to the target mean drop volume by selectively firing selected nozzles." Claims 23 and 31 recite substantially similar control systems "configured to set the actual mean drop volume of the die to the target mean drop volume by selectively firing selected nozzles of the die."

In contrast to Tachihara, claims 1, 12, 23 and 31 do not seek to drop merely different amounts of ink; rather, these claims seek to "set the actual mean drop volume provided by the plurality of nozzles to the target mean drop volume." Because Tachihara does not disclose setting the actual mean drop volume to the intended mean drop volume, the examiner's rejection of claims 1, 12, 23 and 31 under 35 U.S.C. § 102(b) should be withdrawn.

Claim 36 recites a plurality of nozzles "the predetermined intended distribution being based on a normal distribution" of nozzle sizes. Claims 4 and 15 also recite a normal distribution of nozzle sizes. Contrary to the examiner's characterization,

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Tachihara fails to disclose a normal distribution of nozzle sizes. This is seen particularly in Fig. 1(a) (below), which the examiner suggests depicts a normal distribution.

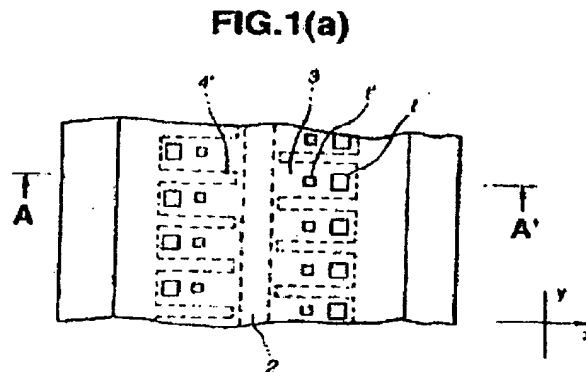


Fig. 1(a) clearly depicts a plurality of nozzles of only two different sizes. Such structure is a binary distribution of nozzle sizes, and thus is not properly characterized as a normal distribution of nozzle sizes. As asserted by the Examiner in the restriction requirement dated March 22, 2006, a fluid ejection device having a normal predetermined intended distribution of nozzle sizes (Species III) and a fluid ejection device having a binary predetermined intended distribution of nozzle sizes (Species IV) are "mutually exclusive" species. Accordingly, based on the examiner's own characterization of binary and normal nozzle size distributions, the rejection of claims 4, 15 and 36 under 35 U.S.C. § 102(b) should be withdrawn.

Claims 4, 6 and 10 depend from claim 1. Claims 15, 17, 19 and 21 depend from claim 12. Claims 25 and 27-30 depend from claim 23 (claim 30 was not addressed in the Office Action, but it depends from claim 23). Claims 41 and 42, as amended, depend on claim 36. Therefore, with claims 1, 12, 23 and 36 in condition for allowance, all these dependent claims are allowable for at least the same reasons.

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Claim 8 recites a controller and claim 19 recites a control system, both of which are "configured to set the actual mean drop volume of the die to the target mean drop volume by selectively firing some nozzles of a subset of commonly sized nozzles." Tachihara does not disclose or suggest discharging less than all of a subset of commonly sized nozzles. Claims 8 and 19 are therefore allowable over Tachihara for at least this additional reason, and the rejections of claims 8 and 19 under 35 U.S.C. § 102(b) should be withdrawn.

Rejections under 35 USC § 103

In the May 16, 2006 Office Action, claims 6-7, 17-18 and 27-28 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tachihara et al (US 6,447,088 B2) in view of Rezanka (US 5,412,410). Applicants respectfully disagree.

Rezanka discloses an ink jet printhead for continuous tone and text printing containing two or more groups of selectively activatable heating elements and associated nozzles. Selected nozzles from two or more groups are used to print single pixels for text printing, and predetermined combinations of nozzles from each of the groups of nozzles are used to compose and to print halftone cells.

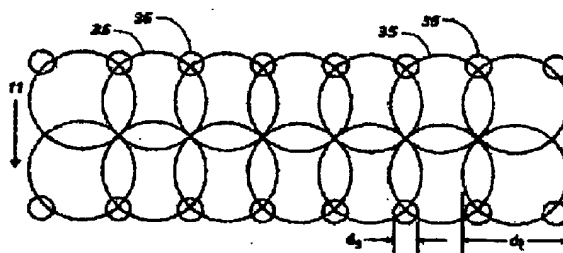


FIG. 11

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Rezanka first addresses text printing. As shown in Fig. 11 (reproduced above), "[q]uality, high resolution printing of **text Images** may be achieved." Col. 6, line 68 – Col. 7, line 1. The small pixels 36 reduce "the scalloping effect along the outer edges" of the big pixels 35. Col. 7 lines 38-39.

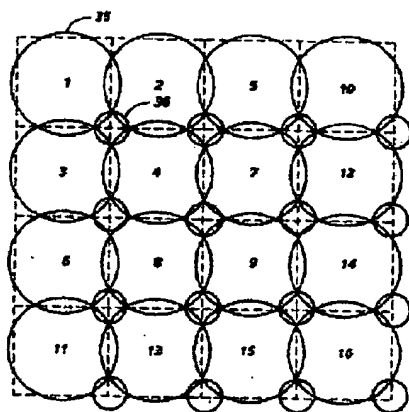


FIG. 16

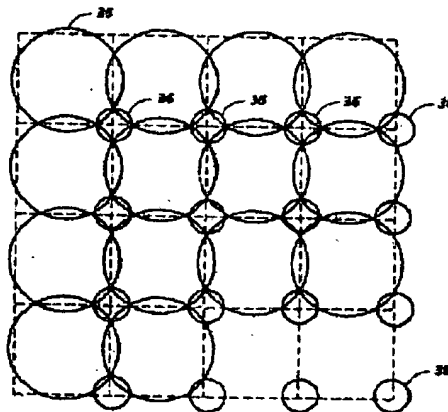


FIG. 22

Rezanka otherwise is concerned with printing by halftone cells when continuous tone or grey scale printing is desired. Fig. 16 (seen above) shows a halftone cell at the maximum absorbance step, and Fig. 22 (seen above) shows a halftone cell at an intermediate absorbance step. It will be appreciated from these illustrations that the two sizes of nozzles allow for sufficient number of absorbance steps to achieve high quality offset lithography.

As discussed above with respect to Tachihara et al, Rezanka does not disclose increasing or decreasing the actual mean drop volume by selectively firing nozzles of a subset. Claims 6-7, 17-18 and 27-28, as amended, recite pluralities of nozzles and

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some variation of the following: "wherein the controller [increases or] decreases the actual mean drop volume to the target mean drop volume by selectively firing nozzles of the subset."

Rezanka does not mention selectively firing subsets of nozzles for the purpose of increasing or decreasing an actual mean drop volume to any target value. Instead, Rezanka fires nozzles to achieve sufficient number of absorbance steps or reducing scalloping effects in text printing. For at least the foregoing reasons, the rejection of claims 6-7, 17-18 and 27-28 under 35 U.S.C. § 103(a) should be withdrawn.

In the Office Action, claims 10, 21 and 44 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tachihara et al (US 6,447,088 B2) in view of Yuan (US 5,447,088). Applicants respectfully disagree.

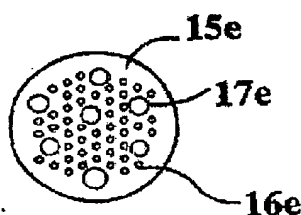


Figure 2f

Yuan discloses a method for producing droplets whereby fluid is impelled through various arrangements of openings. One embodiment, depicted in Fig. 2f (seen above), shows one such arrangement, with "openings 16e [incorrectly labeled as 17e], 16g of different diameters, thus allowing variably sized droplets to be produced with a tailored size and flux distribution that is in part dependent on the size distribution of the openings." Col. 6 lines 49-52.

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Claims 10, 21 and 44 recite pseudorandom intermixing of different sized nozzles. For instance, claim 44 recites a "printhead die of claim 36, wherein the location of the first group of nozzles and the second group of nozzles are arranged to be pseudorandomly intermixed." Yuan describes "variably sized droplets to be produced with a tailored size and flux distribution of the openings." Col. 6 lines 49-52 (emphasis added). Yuan's description of Fig. 2f indicates that the openings fitting a "tailored size...distribution" are actually distributed to suit a special purpose. In contrast, claims 10, 21 and 44 recite a pseudorandom intermixing, which indicates distribution without any special purpose. Therefore, claims 10, 21 and 44 as amended are allowable, and the rejection of claim these claims under 35 U.S.C. § 103(a) should be withdrawn.

In the Office Action, claim 25 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Tachihara et al (US 6,447,088 B2) in view of Raman et al. (US 6,655,775). Applicants respectfully disagree.

Raman discloses normal or Gaussian distribution curve for an inkjet print head that is produced in a manufacturing environment. This normal distribution curve tends to be representative of inkjet print heads which are formed in high volume. Raman does not disclose "a plurality of nozzles configured with various intended sizes, wherein the intended size of each nozzle is selected according to a predetermined intended distribution," the predetermined intended distribution being "based on a normal probability distribution of intended nozzle sizes." Put another way, Raman describes a resulting distribution being dependent on the actual sizes of the nozzles, whereas claim 25 recites the resulting sizes of the nozzles being dependent on the predetermined

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intended distribution. Therefore, the rejection of claim 25 under 35 U.S.C. § 103(a) should be withdrawn.

Conclusion

Applicants believe that this application is now in condition for allowance, in view of the above amendments and remarks. Accordingly, applicants respectfully request that the Examiner issue a Notice of Allowability covering the pending claims. If the Examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney of record.

Respectfully submitted,

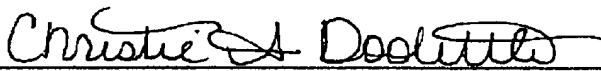
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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to Examiner S. Fidler, Group Art Unit 2861, Assistant Commissioner for Patents, at facsimile number (571) 273-8300 on August 16, 2006.



Christie A. Doolittle

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